

Maritime Working Group Meeting - Updating the Commercial Marine Vessel Emission Inventory



**April 9, 2002
Long Beach, CA**

Air Resources Board

California Environmental Protection Agency

California's Emissions Inventory

- **Includes emission estimates and forecasts for all anthropogenic and natural sources**
- **Collaborative effort to develop methodologies and collecting data**
- **Regularly updated to reflect the most recent information**

Uses for the Emission Inventory

- **Estimate emissions for specific locations or regions**
- **Monitor trends and project future emissions**
- **Use in air quality models to help assess potential impacts of emission reduction strategies**
- **Evaluate spatial characteristics**

Existing Commercial Marine Vessels Inventory

- **Developed primarily by the Air Pollution Control and Air Quality Management Districts**
- **Includes emission estimates for ocean-going vessels and harbor craft**
- **Methodology varies from district-to-district**
- **No set schedule for updates**

Goals for the Commercial Marine Inventory Update

- Build into ARB OFFROAD model
- Develop a consistent methodology
- Update the emission estimates to reflect the current fleet
- Accurately reflect adopted regulations and other regulatory programs in the baseline inventory and forecasts
- Identify the process and timeframes for future updates

Scope of the Commercial Marine Emission Inventory Update

- Address both ocean-going ships and harbor craft
- Update emission estimates for NO_x, PM, CO, SO_x, and HC
- Base methodology on approach used in SCAQMD commercial marine vessel emission inventory update (ARCADIS)
- Initial inventory boundary includes California coastal waters



Ocean-going Vessels

- Container ships
- Tankers
- Bulk carriers
- Reefers
- Passenger ships
- Vehicle carriers



Vessels Characterized as “Harbor Craft”

- Tugs and tow boats
- Ferries and excursion vessels
- Commercial fishing boats
- Crew and supply boats
- Dredges
- Barges



Basic Methodology for Estimating Emissions from Ocean-going Vessels and Harbor Craft

$$\text{Emissions} = \sum \left[\text{activity} \right] \times \left[\text{population} \right] \times \left[\text{emission factor} \right]$$

Information Needed for Ocean-going Vessel Emission Inventory

- **Vessel Activity Information**
 - time in mode
 - distance traveled (route characterization)
 - number of calls
- **Vessel Population Characteristics**
 - vessel type
 - engine load/horsepower
 - vessel speed
 - auxiliary engines
- **Emission Factors**
 - cruising, maneuvering, and hotelling
 - power-based

Data Sources for Information About Ocean-going Vessels

- **Vessel Activity**
 - In-port information - Marine Exchange and wharfingers (or similar port record keeping groups)
 - Vessel routes - Marine Exchange, U.S. Army Corps of Engineers
- **Vessel Population Characteristics**
 - Vessel-specific data - Lloyd's Maritime Information Services
- **Emission factors**
 - Lloyd's Marine Exhaust Emissions Research Programme

Information Needed for Harbor Craft Vessel Emission Inventory

- Tugs and Tow Boats
 - annual fuel consumption information
 - emission factors
- Other Harbor Craft
 - brake-specific fuel consumption data
 - emission factors

Data Sources for Information About Harbor Craft

- For all harbor craft
 - In-port information - Owner/operators, U.S. Coast Guard data
 - Vessel-specific data - Owner/operators
 - Fuel consumption - Owner/operators
 - Brake-specific fuel consumption data - Lloyd's or engine manufacturers
 - Emission factors - Lloyd's Marine Exhaust Emissions Research Programme

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